



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/098,593

03/18/2002

Shinichi Kojima

ASA-1075

7649

24956

7590

05/14/2004

MATTINGLY, STANGER & MALUR, P.C.
1800 DIAGONAL ROAD
SUITE 370
ALEXANDRIA, VA 22314

EXAMINER

SONG, HOON K

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 05/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/098,593

Applicant(s)

KOJIMA ET AL.

Examiner

Hoon Song

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18, 20-25 and 27 is/are rejected.
- 7) ☒ Claim(s) 19 and 26 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 March 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-2, 4, 6-13, 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nutt et al. (US 6449331B1) in view of Tamura et al. (US 6212251B1).

Regarding claims 1 and 6, Nutt teaches a radiological imaging apparatus comprising:

- an X-ray source (22) that radiates X-rays;
- a first x-ray source transfer apparatus (column 5 line 24+) for rotating said x-ray source around a bed (10) supporting a test subject (16);

Art Unit: 2882

a plurality of radiation detectors (24) that output both a first detection signal which is a detection signal of said X-rays that have passed through a test subject and a second detection signal which is a detection signal of gamma-rays radiated from said test subject (column 6 line 8+).

However Nutt fails to teach a second x-ray source transfer apparatus for moving said x-ray source in a longitudinal direction of said bed.

Tomura teaches a helical scanning type x-ray CT system having a second x-ray transfer apparatus (see figure 1, where wheels that move the gantry in the rear to front direction) for moving an x-ray source in a longitudinal direction of a bed (figure 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide CT/PET system of Nutt with the source transfer apparatus (wheels) as taught by Tomura, since the source transfer apparatus of Tomura would prevent image artifacts/blurring results from patient movement during whole or elongated imaging.

Regarding claims 2 and 8, Nutt teaches that a tomographic image data creation apparatus that creates first tomographic image data of said test subject based on said first detection signal, creates second tomographic image data of said test subject based on said second detection signal and creates fused tomographic image data combining said first tomographic image data and said second tomographic image data (column 6 line 8+).

Regarding claims 4 and 9, Nutt teaches that said radiation detector is a scintillator (column 7 line 23+).

Regarding claim 7, Nutt teaches that a plurality of signal discriminators connected to said respective radiation detectors, which separate said first detection signal and said second detection signal from said output signal entered (column 7 line 13+ and column 6 line 17+).

Regarding claims 10, Nutt teaches a radiological imaging apparatus comprising:
an X-ray source (22) that radiates X-rays;

a first x-ray source transfer apparatus for rotating said x-ray source around a bed supporting a test subject;

a plurality of first radiation detectors (24a) that output an output signal including a first detection signal which is a detection signal of said X-rays that have passed through a test subject and a second detection signal which is a detection signal of gamma-rays radiated from said test subject (column 5 line 50+);

a plurality of second radiation detectors (24b) that output an output signal including a first detection signal which is a detection signal of said X-rays and a second detection signal which is the detection signal of gamma-rays (column 5 line 50+);

a signal processor that calculates an intensity of said first detection signal based on the output signal of said first radiation detector (column 6 line 51+);

a signal discriminator that separates said second detection signal from the output signal of said second radiation detector (column 6 line 17+) ; and

a counter that calculates a count rate for the second detection signal separated by said signal discriminator (column 7 line 4+).

However Nutt fails to teach a second x-ray source transfer apparatus for moving said x-ray source in a longitudinal direction of said bed.

Tomura teaches a helical scanning type x-ray CT system having a second x-ray transfer apparatus (see figure 1, where wheels that move the gantry in the rear to front direction) for moving an x-ray source in a longitudinal direction of a bed (figure 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide CT/PET system of Nutt with the source transfer apparatus (wheels) as taught by Tomura, since the source transfer apparatus of Tomura would prevent image artifacts/blurring results from patient movement during whole or elongated imaging.

Regarding claim 11, Nutt teaches a tomographic image data creation apparatus that creates first tomographic image data of said test subject based on the intensity of said first detection signal, creates second tomographic image data of said test subject based on the count rate of said second detection signal and creates fused tomographic image data combining said first tomographic image data and said second tomographic image data (column 6 line 8+).

Regarding claims 12, Nutt teaches a radiological imaging apparatus comprises;
a test subject holding apparatus provided with a bed which is movable in a longitudinal direction to carry a test subject; and
an image pickup apparatus, wherein said image pickup apparatus comprises (figure 1 and 2):

a radiation detector ring structure that surrounds an area in which said bed is

Art Unit: 2882

inserted and includes a plurality of radiation detectors;

an X-ray source that irradiates said test subject with X-rays; and

a first X-ray source transfer apparatus (column 6 line 2+) that transfers said X-ray source in the circumferential direction of said radiation detector ring structure; and

said respective radiation detectors output both a first detection signal which is the detection signal of said X-rays that have passed through said test subject and a second detection signal which is the detection signal of gamma-rays radiated from said test subject (column 5 line 50+).

However Nutt fails to teach a second x-ray source transfer apparatus for moving said x-ray source in a longitudinal direction of said bed.

Tomura teaches a helical scanning type x-ray CT system having a second x-ray transfer apparatus (see figure 1, where wheels that move the gantry in the rear to front direction) for moving an x-ray source in a longitudinal direction of a bed (figure 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide CT/PET system of Nutt with the source transfer apparatus (wheels) as taught by Tomura, since the source transfer apparatus of Tomura would prevent image artifacts/blurring results from patient movement during whole or elongated imaging.

Regarding claim 13, Nutt teaches a tomographic image data creation apparatus that creates first tomographic image data of said test subject based on the intensity of said first detection signal, creates second tomographic image data of said test subject based on the count rate of said second detection signal and creates fused tomographic

Art Unit: 2882

image data combining said first tomographic image data and said second tomographic image data (column 6 line 8+).

Regarding claim 20, Nutt teaches that said radiation detector is a scintillator (column 7 line 21+).

Regarding claim 21, Nutt teaches a radiological imaging apparatus comprising:
a test subject holding apparatus provided with a bed (10) which is movable in a longitudinal direction to carry a test subject (16); and

an image pickup apparatus (figure 1),

wherein said image pickup apparatus comprises:

a radiation detector ring structure that surrounds an area in which said bed is inserted and includes a plurality of radiation detectors (figure 1 and 2);

an X-ray source (22) that irradiates said test subject with X-rays;

a first X-ray source transfer apparatus (column 6 line 2+) that transfers said X-ray source in the circumferential direction of said radiation detector ring structure;

said respective radiation detectors output an output signal including a first detection signal which is the detection signal of said X-rays that have passed through said test subject and a second detection signal which is the detection signal of gamma-rays radiated from said test subject (column 5 line 38+).

However Nutt fails to teach a second x-ray source transfer apparatus for moving said x-ray source in a longitudinal direction of said bed.

Tomura teaches a helical scanning type x-ray CT system having a second x-ray transfer apparatus (see figure 1, where wheels that move the gantry in the rear to front direction) for moving an x-ray source in a longitudinal direction of a bed (figure 1).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide CT/PET system of Nutt with the source transfer apparatus (wheels) as taught by Tomura, since the source transfer apparatus of Tomura would prevent image artifacts/blurring results from patient movement during whole or elongated imaging.

Regarding claim 22, Nutt teaches that a signal discriminator which separates said first detection signal and said second detection signal from said output signal entered and which is connected to each of said plurality of radiation detectors (column 7 line 14+).

Regarding claim 23, Nutt teaches that said signal discriminator that separates said first detection signal and said second detection signal based on energy of said output signal (column 7 line 14+, and column 6 line 17+).

Regarding claim 24, Nutt teaches that a tomographic image data creation apparatus that creates first tomographic image data of said test subject based on said first detection signal, creates second tomographic image data of said test subject based on said second detection signal and creates fused tomographic image data combining said first tomographic image data and said second tomographic image data (column 6 line 8+).

Art Unit: 2882

Regarding claim 27, Nutt teaches that said radiation detector is either a semiconductor radiation detector or scintillator (column 7 line 22+).

Claims 3 and 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nutt as modified by Tomura further in view of Boutenko et al. (US 6332014B1).

Regarding claims 3, 14 and 17, Nutt as modified by Tomura fails to teach that a controller pulsing x-ray source for a set time.

Boutenko teaches pulsing x-ray source in predetermined time (column 1 line 15+).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the CT/PET system of Nutt as modified by Tomura with the pulsing x-ray source as taught by Boutenko, since the pulsing x-ray source of Boutenko would provide reduced patient x-ray exposure dosage so that it would prevent any adverse effect for patients.

Regarding claims 15, Nutt teaches that for each of said radiation detectors:

a first signal processor that processes said first detection signal (column 6 line 8+);

a second signal processor that processes said second detection signal (column 6 line 8+);

a signal processor provided with a switching apparatus that transmits said first detection signal from said radiation detectors to said first signal processor and transmits said second detection signal from said radiation detectors to said second signal processor (column 7 line 14+); and

a switching control apparatus that controls said switching apparatus so that said first detection signal output from said radiation detector selected according to the position of said X-ray source transfer apparatus in the circumferential direction of said radiation detector ring structure is transmitted to said first signal processor (column 6 line 8+).

Regarding claim 16, Nutt teaches a tomographic image data creation apparatus that creates first tomographic image data of said test subject based on the intensity of said first detection signal, creates second tomographic image data of said test subject based on the count rate of said second detection signal and creates fused tomographic image data combining said first tomographic image data and said second tomographic image data (column 6 line 8+).

Claims 5, 18 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nutt as modified by Tomura as in view of Ohnesorge et al. (US 5666391).

Regarding claims 5, 18 and 25, Nutt as modified by Tomura fails to teach that an image pickup apparatus is provided with a collimator with collimator transfer apparatus.

Ohnesorge teaches the collimator used in CT imaging system (abstract).

It would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to adapt the collimator in order to provide partial shielding against the obliquely incident scattered radiation (column 1 line 23+). Accordingly one would be motivated to adapt the collimator because it would provide better x-ray image by reducing scattered radiation (column 1 line 17+).

Allowable Subject Matter

Claims 19 and 26 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: None of the prior art teaches or suggest a CT/PET system having a collimator transfer apparatus that transfers the collimator in the axial direction of the radiation detector ring structure as claimed in dependent claims 19 and 26.

Response to Arguments

Applicant's arguments with respect to claims 1-27 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

Art Unit: 2882

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoon Song whose telephone number is (571) 272-2494.

The examiner can normally be reached on 8:30 AM - 5 PM, Monday - Friday.

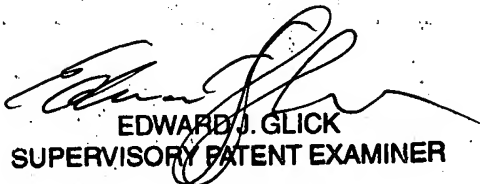
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on (571) 272 - 2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HKS

516104

HKS


EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER